

a charge port comprising an air lock controlled by a ball valve and capable of sequentially receiving a plurality of discrete combinations of reactants;

a reaction chamber in communication with said charge port, said reaction chamber being capable of receiving and enclosing the plurality of discrete combinations of reactants disposed linearly within said chamber;

a discharge port comprising an air lock controlled by a ball valve to sequentially discharge reaction products of said combinations from said reaction chamber; and

a controller in communication with said reaction vessel to control varying reaction parameters within said chamber.

REMARKS

The following changes to the drawings are requested hereby, as shown in the sketches submitted herewith: redesignation of the vials in array 22 by reference numeral 24 rather than 34, specification, page 4, line 14; insertion of the proper reference numeral 52 for the discharge port of Figure 2, specification, page 4, line 25; and proper designation of the heat controller in Figure 3 as 108 rather than 10, specification, page 5, line 24.

The amendments to the specification correct various editorial errors and add inadvertently deleted passages. On page 5, an incorrect figure designation has been corrected. A table designation and column headings for Table 12 have been furnished. Table 14 has been provided in a more logical order. On page 6, the reference to a misdescribed drawing reference numeral 16 has been deleted.

Claims 1-15 and 26-35 are now in this application, with claims 1-15 being withdrawn from consideration.

New claims 26-35 are directed to apparatus designed for the performance of combinatorial chemistry operations, particularly those involving reaction between liquids and gases as illustrated by the preparation of diaryl carbonates by the reaction of a hydroxyaromatic compound with carbon monoxide and oxygen in the presence of a catalyst system. A key feature of the claimed apparatus is its capability of **sequentially receiving and discharging** a plurality of discrete reactant combinations and the products thereof. For example, a plurality of vials containing phenol and various catalyst combinations may be charged to the apparatus in

sequence, contacted therein for a predetermined time with carbon monoxide and oxygen under constant conditions of temperature and pressure and then discharged. The means for doing this are described in detail in the specification.

Claims 16-25 were rejected under 35 USC 112, second paragraph, as being incomplete by omitting the cooperative relationships of the vessel, charge port, discharge port and reaction chamber. This rejection has been overcome by writing new claims 26 and 35 in subparagraph form, whereby said relationships are clarified.

Claims 16-25 were rejected under §112, second paragraph, by reason of the employment of various expressions. These rejections are courteously traversed with respect to the newly added claims, since each of the criticized expressions is believed to be precise and definite in context. For the sake of expediting prosecution, several changes have been made in drafting the new claims; specifically, the words "adapted to" have been changed to "capable of", "sized" has been changed to "of a size adequate" and the term "reaction zone" has been deleted. Nevertheless, applicant submits that the terms originally used are proper.

Regarding "adapted to", the Examiner's position is that there is no description of the precise adaptation. But those skilled in the art would readily understand the meaning of this phrase, and in particular that the precise details of adaptation are immaterial; all are included within the invention as claimed. The same is true of the phrase "capable of", now used in place thereof. It appears that this rejection has some aspects of a rejection under the **first** paragraph of §112 for undue breadth, but if so, it is neither appropriate nor appropriately worded.

The rejection of claims 16 and 25 by reason of lack of clarity about whether it is the reaction chamber or the charge port that is "adapted" or "capable" has been overcome by the addition in claims 26 and 35 of specific language clarifying that fact.

Regarding "sized" in cancelled claim 17 or its replacement phrase "of a size" in new claim 27, those skilled in the art will understand that the reaction chamber should be capable of handling the vials to be inserted therein, regardless of the size of the vials used. As for configuration, the claim clearly recites that the vials are received sequentially. Nothing more is needed.

The rejection of claim 20 based on "reaction zone" has been overcome by the absence of those words from new claim 30.



Claims 16 and 17 were rejected under 35 USC 102(b,e) as anticipated by **Cody et al.** This rejection is courteously traversed with respect to corresponding new claims 26 and 27. A study of the reference patent, with particular attention to the passages specifically cited in the Office Action, reveals that the combinatorial chemistry apparatus disclosed therein lacks any capability of **sequentially** receiving and discharging reactant combinations and their products. The containers described for the **Cody et al.** combinations are reaction tubes that are placed immovably in a reservoir rack within the hollow chamber which serves as the manifold. Gaseous or liquid materials may be admitted to the manifold through the reaction ports designated 23, but this operation does not involve any movement of the reaction tubes; they remain stationary throughout the reaction sequence. Applicant's apparatus, on the other hand, clearly requires facility for sequential passage of reactant combinations and their products into the charge port, through the reaction chamber and out of the discharge port.

Thus, **Cody et al.** fails to anticipate applicant's invention. Further, all grounds of rejection under §112 have been overcome or are untenable. A prompt Notice of Allowance is, therefore, solicited.

Respectfully submitted,



Ben P. Patel
Patent Agent
Reg. No. P-48,420
Phone No. (518) 387-6223 or
(518) 387-7122

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General electric Company
Corporate Research & Development Center
1 Research Circle K1-4A59
Niskayuna, NY 12309

ATTACHMENT A

Page 5, line 19, to page 6, line 2:

FIG. 1 shows a cut away side view of the reaction vessel 14 showing a stack of vials 24 progressing through longitudinal reaction chamber 32. FIG. [1 also] 3 shows an electronic heating jacket 102 encompassing chamber 32. FIG. 3 further shows jacket 102 in combination with a structure for controlling temperature conditions within the chamber 32. The structure includes insulation 104 interposed within jacket 102, a high precision temperature measuring device 106, and a feedback heat controller 108. Examples of the high precision temperature measuring device include a thermocouple, thermistor, or platinum resistance thermometer. Heat controller 108 is attached to the interior of chamber 32 by leads 110. Electronic heating jacket 102 is shown with feedback control via temperature measuring device 106, which can be a probe, and heat controller 108. Other combinations can be used to control the temperature in chamber 32 such as a vapor heating jacket with pressure control, so long as the temperature can be controlled to within $\pm 2^{\circ}\text{C}$, desirably within $\pm 1^{\circ}\text{C}$ and preferably within $\pm 0.5^{\circ}\text{C}$.

Page 6, lines 15-27:

Each thin film formulation is deposited into a vial 24 to provide an array of reaction vials 24. Vial 24 is preferably formed of a rigid material that is chemically inert in the reaction environment. An example of an acceptable vial for many reactions is a glass vial. When dealing with liquids with low vapor pressures or with lengthy reactions, it may be desirable to provide a covering, such as a selectively permeable cap [16] or a septum (not shown) incorporating a feed tube or needle disposed such that a gas is allowed to move freely into and out of vial 24 while depletion of liquid by evaporation is minimized. This arrangement allows an external pressure source to act upon the gas in the reactant environment while evaporation of liquid is limited. In most applications, suitable materials for the cap include polytetrafluoroethylene (PTFE) and expanded PTFE. A suitable cap for use with 2 ml glass vials is "Clear Snap Cap, PTFE/Silicone/PTFE with Starburst, 11mm", part no. 27428, available from Supelco, Inc., Bellefonte, Pennsylvania.